IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | U-SIG Comment Resolution Part 2 | | | | | | Date: 2021-03-02 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Alice Chen | Qualcomm |  |  | alicel@qti.qualcomm.com | | Sameer Vermani | Qualcomm |  |  | svverman@qti.qualcomm.com | | Youhan Kim | Qualcomm |  |  |  | | Bin Tian | Qualcomm |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

This submission proposes resolutions for the following comments from the CC34 on P802.11be D0.3:

NOTE – Set the Track Changes Viewing Option in the MS Word to “All Markup” to clearly see the proposed text edits.

**Revision History:**

R0: Initial version. Resolve CID 1370, 1371, 1372, 1373, 2179, 2635, 2636, 2638, 2804, 2805, 3105, 3106, 3183, 3292, 3407.

R1: Minor revisions.

R2: Minor revisions.

# CID 1370, 3183, 3292

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 3183 | 36.3.11.7.3 | 240.20 | CRC computation is the same as 27.3.11.7.3 | Delete the entire subclause 36.3.11.7.3. And replace all references to 36.3.11.7.3 to 27.3.11.7.3. | Revised.  Accept this comment and proposed change in principle. We replaced the paragraphs and equations and Figure 36-33 related to CRC computation by “The CRC computation of U-SIG and EHT-SIG use the same CRC computation as described in 27.3.11.7.3 (CRC computation).”  Note to editor: Same resolution for CID 3183, 1370.  *TGbe Editor: Please make changes for CID 3183 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |
| 1370 | 36.3.11.7.3 | 240.20 | This is a dup of 27.3.11.7.3 CRC computation | Replace by a xref and "CRC for U-SIG is calacualted the ways way as for HESIGA" | Revised.  Resolution to CID 3183 addresses this.  *TGbe Editor: Please make changes for CID 1370 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |
| 3292 | 36.3.11.7.3 | 240.28 | add how to get CRC for the common field of the EHT-SIG and the User Block field of EHT-SIG. In the current spec, it shows CRC calculation in U-SIG. | as in comment | Revised.  Agree that it should be made clear that the CRC computation in EHT-SIG is in the same way as described in this sub-caluse. But we don’t want to address it with too much details, since the bits used for CRC computation in EHT-SIG are given in P248L33-35, P249L35-43, P259L47-50, P260L44-46, P261L24-28.  Back in D0.1 and 0.2, there was a description of EHT-SIG using TBD bits. We deleted it to avoid redundancy.Our proposed resolution is simply add one sentence “The CRC computation of U-SIG and EHT-SIG use the same CRC computation as described in 27.3.11.7.3 (CRC computation).”  *TGbe Editor: Please make changes for CID 3292 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |

***Instructions to the editor:***

**Please make the changes to P240L20-P241L21 as shown below:**

### 19 36.3.11.7.3 CRC computation

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21

1. The CRC computation defined in this subclause applies to U-SIG, the Common field of EHT-SIG, and the
2. User Block field of EHT-SIG.

24

25 The CRC is calculated over bits 0 to 41 of the U-SIG field. Bits 0 to 41 of the U-SIG field correspond to bits

26

27 0–25 of U-SIG-1 followed by bits 0–15 of U-SIG-2.

28

The CRC computation of U-SIG and EHT-SIG use the same CRC computation as described in 27.3.11.7.3 (CRC computation).

# CID 1371, 2179, 2804

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 1371 | 36.3.11.7.4 | 240.32 | "This process happens on a per-80 MHz frequency segment basis as U-SIG field may have different contents in different 80 MHz frequency segments" does not make sense until some description of frequency duplication is provided | Introduce the notion (by reference or verbiage) beforehand. As well, start out at P230L1 by defining that there are max(1, BW/80M) different U-SIG content channels, and each content channel of the U-SIG field comprises ... Then use the notion of content channel throughout this section to modify "U-SIG field" | Revised.  Note that the commenter gave a wrong page number of 240, and the correct page number is 241.  Add a short paragraph in P229L48 to introduce the concept of U-SIG content variation.  *TGbe Editor: Please make changes for CID 1371 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |
| 2179 | 36.3.11.7.4 | 241.41 | It is better to replace "80 MHz frequency segment i\_80FS" by "80 MHz frequency subblock l" to be aligned with other clauses (e.g. 36.3.11.8.6) | as suggested in the comment | Accepted |
| 2804 | 36.3.11.7.4 | 241.44 | Is it "frequency segment" or "80 MHz segment"? | Use consistent wording | Revised.  Change “segment” to “subblock”. Ditto P232L27, P232L38, P233L11, P241L33-L35, P241L41, P243L27, P243L31.  Resolution to CID 2179 addresses this.  *TGbe Editor: Please make changes for CID 2804 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |

***Instructions to the editor:***

**Please add the following paragraph to P229L48 as shown below:**

For a 40 MHz EHT PPDU or ER preamble, the U-SIG content shall be identical in both 20 MHz subchannels. For an 80 MHz EHT PPDU or ER preamble, the U-SIG content shall be identical in all non-punctured 20 MHz subchannels. For a 160/320 MHz EHT PPDU or ER preamble, the U-SIG content shall be identical in all non-punctured 20 MHz subchannels within each 80 MHz subblock, and the U-SIG content in different 80 MHz subblocks may be different.

# CID 1372, 1373

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| 1372 | 36.3.11.7.4 | 242.30 | Using U-SIG-1 (for instance) for both the first 26 data bits (e.g. Table 36-22) and the first OFDM symbol (e.g. fig 36-34)is a double abuse of terminology since a) BCC encoding causes the first 26 data bits to smear into the second OFDM symbol), and b) U-SIG-1-R doesn't carry \*new\* data\* bits so logically U-SIG-1-R carries repeated bits not data bits). | \*Don't\* refer to U-SIG-1 or 2 when talking about OFDM symbols; and don't call them parts either, since the "parts" terminology only applies to the data bits. Try "For an ER preamble, the U-SIG field is composed of four OFDM symbols, named, in sequential order, U-SIG-1-U, U-SIG-1-R, U-SIG-2-U and U-SIG-2-R. In the ER preamble, the U-SIG field carries 26+26 data bits or 52+52 BCC encoded bits, where the first 52 BCC encoded bits are repeated across U-SIG-1-U and U-SIG-1-R and the second 52 BCC encoded bits are repeated across U-SIG-2-U and U-SIG-2-R. For each of U\_SIG-1-U and U\_SIG-2-U, the encoded bits shall be interleaved, mapped to a BPSK constellation, and have pilots inserted. For each of U-SIG-1-R and U-SIG-2-R, the encoded bits shall be mapped to a QBPSK constellation without interleaving and have pilots inserted. [In this way U-SIG-1-U and U-SIG-1-R carry with same BCC coded bits but with and without interleaving respectively. Similarly U-SIG-2-U and U-SIG-2-R carry with same BCC coded bits but with and without interleaving respectively.] The constellation mapping of the U-SIG field in an ER preamble is the same as that of the HE-SIG-A field in an HE ER SU PPDU, and is shown in Figure 36-34 (Data subcarrier constellation of U-SIG symbols) [In this figure, add "-U" x4]. The QBPSK constellation on U-SIG-1-R is used to differentiate an ER preamble from an EHT MU PPDU and an EHT TB PPDU. BCC encoding, data interleaving, constellation mapping, and pilot insertion follow the steps described in ..." | Rejected.  We use the terminology (e.g.,”parts”, U-SIG-1 for the first 26 data bits, U-SIG-2 for the second 26 data bits) in the same way as how how HE-SIG-A of the HE ER SU PPDU was described in 11ax spec. There is no confusion. |
| 1373 | 36.3.11.7.4 | 243.06 | Using U-SIG-1 (for instance) for both the first 26 data bits (e.g. Table 36-22) and the first OFDM symbol (e.g. fig 36-34)is an abuse of terminology since BCC encoding causes the first 26 data bits to smear into the second OFDM symbol) | For EHT MU and TB, change U-SIG-1, U-SIG-2 to U-SIG-1-U and U-SIG-2-U respectively. Define that these are the first and second OFDM symbols of U-SIG in the text above. For ER, change U-SIG-1, U-SIG-2 to U-SIG-1-U and U-SIG-2-U respectively. Define that these are the first and second OFDM symbols of U-SIG in the text above. (U = unrotated) | Rejected.  We use the terminology in the same way as how HE-SIG-A of the HE ER SU PPDU was described in Figure 27-25. There is no confusion. |

# CID 2635, 2805, 3105

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 2635 | 36.3.11.7.4 | 241, 242 | Time-domain waveform described in (36-18) to generate U-SIG per 80M segment needs several corrections and clarifications | Edits in equation (36-18) and subsequent text:  1) In the summation, the span of index i\_BW should be over the intersection of Omega\_20MHz with the 80M segment i\_80FS (and not over the entire set Omega\_20MHz)  2) Need to clarify that N\_20MHz and Omega\_20MHz are defined for the entire transmission BW, and not just for the 80M segment that the equation is describing. This is needed to ensure that each 80M signal is properly scaled and frequency-shifted.  3) Replace "K = (N\_20MHz - 1 - 2i).32" with "K\_Shift(i) = (N\_20MHz - 1 - 2i).32"  4) Should clarify that the set of values of K\_Shift(i\_BW) used for each 80M segment are different, since i\_BW is different per 80M segment  5) In the RHS of definition for 'D': should replace 'D' with 'd'  6) Clarify that eta\_Pre-EHT = 1 for EHT MU PPDU (current description only covers EHT TB PPDU) | Revised.  Agree that equation (36-18) needs some corrections.  1), 2) & 4) Change the equation to be the transmit signal on transmission chain Tx, instead of on 80MHz frequency subblock i\_80FS and transmission chain Tx to be consistent to the transmit signal of EHT-SIG.  3) Change to “K\_Shift(i) is defined in 36.3.11.5 (L-SIG)” to avoid redefining a same notation.  5) No, D is defined based on d.  6) Since eta\_Pre-EHT is only defined for EHT TB PPDU, split (36-18) into two equations for EHT MU PPDU and EHT TB PPDU, respectively. This is similar to the transmit signal equations in 36.3.10.4.  *TGbe Editor: Please make changes for CID 2635 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |
| 2805 | 36.3.11.7.4 | 241.55 | The set of 20 MHz channels (Omega\_20MHz) can depend on i\_80FS since puncturing can be applied differently in different 80 MHz segments. | Indicate dependency in formula | Revised.  Resolution to CID 2635 addresses this.  *TGbe Editor: Please make changes for CID 2805 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |
| 3105 | 36.3.11.7.4 | 241.56 | Since Equation (36-18) represents time domain signal for 80MHz frequency segment i80FS, then the summation of iBW should include only the 20MHz channel in that 80MHz segment. Please clarify. | As in comment | Revised.  Resolution to CID 2635 addresses this.  *TGbe Editor: Please make changes for CID 3105 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |

***Instructions to the editor:***

**Please make the changes to P241L41-65 (including Equation 36-18) as shown below:**

For U-SIG in 80 MHz frequency subblock , the complex number assigned to the *k-*th data subcarrier of the *n-*th symbol is denoted as . The time domain waveform for the U-SIG field of an EHT MU PPDU, transmitted on transmit chain , shall be as specified in Equation (36-18).

***Instructions to the editor:***

**Please make the change to P242L3-7 as shown below:**

*K\_Shift*(*i*) is defined in 36.3.11.5 (L-SIG).

***Instructions to the editor:***

**Please add the following paragraph and equation (36-xxx) to P242L38:**

The time domain waveform for the U-SIG field of an EHT TB PPDU, transmitted on transmit chain , shall be as specified in Equation (36-XXX).

(36-xxx)

# CID 2636, 2638, 3106, 3407

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 3047 | 36.3.11.7 | 243.29 | EHT ER SU PPDU may get people confused. since 11be doesn't have such a PPDU format Better just use ER PPDU. | as commented | Revised.  Change “EHT ER SU PPDU” to “EHT ER preamble” since EHT ER PPDU is not defined.  *TGbe Editor: Please make changes for CID 3047 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |
| 2636 | 36.3.11.7.4 | 243.27 | ER preamble is only defined for 20MHz BW | 1) Remove all references to "80MHz frequency segment" and "i\_80FS" immediately before and in equation (36-19) 2) Remove fraction "|Omega\_20MHz|/N\_20MHz" in the denominator as this is equal to 1 for a 20M PPDU | Revised.  Per Motion 137, #SP292, the BW of the EHT ER preamble is not defined and could be any EHT PPDU BW.  However, equation (36-39) needs some changes similar to equation (36-18). Change the equation to be the transmit signal on transmission chain Tx, instead of on 80MHz frequency subblock i\_80FS and transmission chain Tx to be consistent to the transmit signal of EHT-SIG.  Note to editor: Same resolution to CID 2636, 3106.  *TGbe Editor: Please make changes for CID 2636 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |
| 3106 | 36.3.11.7.4 | 243.36 | Equation (36-19) for EHT ER SU U-SIG implies that it only transmits on one 20MHz channel, which is not clear from the spec. If it is not the case, why we need |Ω20MHz|/N20MHz term in the scaling factor? Please fix the equation and clarify EHT ER SU U-SIG applicable bandwidth | As in comment | Revised.  Resolution to comment 2636 addresses this.  *TGbe Editor: Please make changes for CID 3106 as shown in the following document*  [*https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx*](https://mentor.ieee.org/802.11/dcn/21/11-21-0353-02-00be-u-sig-comment-resolution-part-2.docx) |
| 2638 | 36.3.11.7.4 | 243.36 | Misc fixes to equation (36-19) | Replace "epsilon" in the numerator of first term with 1 | Accepted |

***Instructions to the editor:***

**Please make the changes to P243L27-46 (including Equation 36-19) as shown below:**

The time domain waveform for the U-SIG field of an EHT ER preamble, transmitted on transmit chain , shall be as specified in   Equation (36-19).

where

 is a phase rotation vector defined as .